

What is claimed:

1. A modular structure for housing a radiation source comprising:
a plurality of free standing transportable modules connected to form a central treatment area and a barrier substantially surrounding the central treatment area, the central treatment area adapted for human occupation and to contain a therapeutic radiation source, the modules comprising a support frame structure and at least one wall, the barrier including first and second spaced apart rigid walls and a quantity of radiation shielding filler material contained between the first and second walls, the quantity of filler material sufficient to substantially reduce the measurable radiation level outside the central treatment area when a radiation source is placed in the central treatment area.
2. The modular structure of claim 1 wherein at least two of the plurality of modules each include portions of said first and second spaced apart rigid walls, the portions defining a channel comprising a portion of the barrier.
3. The modular structure of claim 2 wherein the channels in the at least two modules are adjacent and substantially aligned.
4. The modular structure of claim 3 wherein the adjacent channels are in fluid communication such that radiation shielding filler material provided into one channel can flow into the adjacent channel.

5. The modular structure of claim 1 further comprising:

a second plurality of free standing transportable modules connected to form a roof over the central treatment area.

6. The modular structure of claim 5 wherein:

the roof includes a roof barrier above the central treatment area, the roof barrier comprising a rigid floor supporting a quantity of radiation shielding filler material above the central treatment area.

7. The modular structure of claim 6 wherein:

the second plurality of modules include portions above the barrier formed by the first plurality of modules, the portions above the barrier including a quantity of radiation shielding filler material and comprising a portion of the roof barrier.

8. The modular structure of claim 7 wherein:

the portions of the second plurality of modules over the barrier formed by the first plurality of modules are in fluid communication with the barrier such that radiation shielding filler material provided into the roof barrier can flow into the barrier.

9. The modular structure of claim 8 wherein:

the weight of the second plurality of modules and the roof barrier is substantially supported by a portion of the barrier.

10. The modular structure of claim 1 wherein:

portions of the plurality of modules define an area outside the central treatment area and the barrier, the outside area adapted to form rooms suitable for human occupation.

11. The modular structure of claim 10 wherein:

the outside area comprises at least one wall and a floor.

12. The modular structure of claim 7 wherein:

the first and second plurality of modules each have a length not exceeding about 53 feet, a width not exceeding about 14 feet, and a height not exceeding about 13 feet 6 inches.

13. The modular structure of claim 12 wherein:

each of the modules have a major axis defined along their length and the major axes of the first plurality of modules are substantially parallel to each other and the major axes of the second plurality of modules are substantially parallel to each other.

14. The modular structure of claim 13 wherein:

the major axes of the second plurality of modules are substantially perpendicular to the major axes of the first plurality of modules.

15. The modular structure of claim 1 wherein:

the plurality of modules are coupled to a foundation and the barrier abuts the foundation.

16. The modular structure of claim 12 wherein:

the plurality of modules comprise at least 3 modules.

17. The modular structure of claim 16 wherein:

the central treatment area comprises a portion of at least one module and at least one module comprises a steel base frame for supporting a medical treatment device.

18. The modular structure of claim 1 wherein:

at least one module comprises a door providing access to the central treatment area, the door comprising radiation shielding material.

19. The modular structure of claim 18 comprising:

radiation shielding panels between at least two of the modules, the radiation shielding panels comprising a portion of the barrier.

20. A method of constructing a modular structure for housing a radiation source comprising:

forming a central treatment area sized and configured for human occupation and to contain a therapeutic radiation source,

connecting a plurality of free-standing transportable modules to form a barrier zone substantially surrounding the central treatment area, the barrier zone defined by at least first and second spaced apart rigid walls comprising portions of the plurality of modules,

delivering a quantity of radiation shielding filler material to the barrier zone to form a barrier substantially surrounding the central treatment area, the quantity of filler material sufficient to substantially reduce the measurable radiation level outside the central treatment area when a radiation source is placed in the central treatment area.

21. The method of claim 20 further comprising:

placing portions of at least two of the plurality of modules forming the barrier zone in fluid communication such that radiation shielding filler material can flow between the portions.

22. The method of claim 21 further comprising:

connecting a second plurality of free standing transportable modules to the first plurality to form a roof barrier zone over the central treatment area, and

delivering a quantity of radiation shielding filler material to the roof barrier zone to form a roof barrier above the central treatment area, the quantity of filler material sufficient to substantially reduce the measurable radiation level outside the central treatment area when a radiation source is placed in the central treatment area.

23. The method of claim 22 further comprising:

placing a portion of the roof barrier in fluid communication with the barrier such that radiation shielding filler material provided into the roof barrier can flow into the barrier.

24. The method of claim 23 further comprising:

providing the first plurality of modules with each having a length not exceeding about 53 feet, a width not exceeding about 14 feet, and a height not exceeding about 13 feet 6 inches.

25. The method of claim 21 further comprising:

forming a portion of the barrier zone with at least one of the plurality of modules that includes portions of the first and second spaced apart rigid walls comprising the barrier, and wherein the walls of the at least one module include rigid reinforcing members on the walls and rigid support members mounted between the walls.

26. The method of claim 25 wherein at least two of the plurality of modules have a longer side and a shorter side, the method further comprising:

connecting the long side of one of the plurality of modules to the long side of another of the plurality of modules to form the central treatment area.

27. The method of claim 25 further comprising:

supporting at least a portion of the lateral force load of the radiation shielding filler material on the walls comprising the barrier zone with rigid support members mounted generally between the tops and bottoms of the walls.

28. The method of claim 20 wherein at least one of the plurality of modules includes a radiation shielding door providing access to the central treatment area from an area outside the barrier.

29. The method of claim 28 wherein:

at least one of the plurality of modules includes portions of the first and second spaced apart rigid walls comprising the barrier, the walls including rigid reinforcing members and rigid support members mounted between the walls.

30. An apparatus for forming a radiation treatment center comprising:

a plurality of free standing modules each comprising a support frame and at least two spaced apart rigid walls defining a channel between the walls, the modules each having outer dimensions generally defining a rectangular solid having a major axis,

wherein the modules are adapted to be connected to each other to form a barrier zone substantially surrounding a central treatment area, the barrier zone comprising the channels of the modules and wherein the channels of at least two of the modules are in fluid communication such that radiation shielding filler material provided into one channel can flow into the adjacent channel, and

a second plurality of free standing modules at least one of which comprises a reinforced floor portion, the second plurality of modules adapted to be placed on top of and connected to the first plurality of modules with the reinforced floor portions above and substantially covering the central treatment area,

the second plurality of modules having portions that would be aligned over and in fluid communication with the barrier zone such that radiation filler material provided into the second plurality of modules could flow into the barrier zone.

31. The apparatus of claim 30 wherein each of the modules have a length not exceeding about 53 feet, a width not exceeding about 14 feet, and a height not exceeding about 13 feet 6 inches.

32. The apparatus of claim 31 wherein at least one of the plurality of modules includes rigid reinforcing members generally vertically mounted on the walls and rigid support members mounted between the walls.

33. The apparatus of claim 32 wherein at least one of the modules includes a generally open top above the channel of the module and a generally open bottom below the channel of the module.

34. A transportable module for forming a structure comprising:
a free standing transportable frame structure defining a bottom surface, a top surface and at least first and second spaced apart side surfaces,

a pair of spaced apart reinforced rigid walls mounted to the frame and defining a channel space between the walls,

rigid supports mounted in the channel space between the walls to resist lateral forces acting from inside the channel to force the walls apart,

wherein a substantial portion of the channel space between the walls does not contain a ceiling or a floor such that the channel space is open at its top and bottom such that granular fill material can be provided into the channel space from above the top surface and entirely fill the channel space, and

wherein the module is capable of being lifted by its ends by a standard container mover without substantial deflection to facilitate construction of a structure comprising a plurality of modules.

35. The module of claim 34 wherein:

vertically extending supports are mounted on the walls to provide the reinforcement.

36. The module of claim 35 wherein:

the frame structure and the walls could comprise steel.

37. The module of claim 34 further comprising:

a floor mounted to the frame structure outside the channel space defined by the walls, whereby the floor containing portion is suitable for interior finishing into a finished room.

38. An apparatus for selectively blocking radiation through a doorway comprising:

a door and a retractable threshold adjacent the door, wherein the door and the retractable threshold each comprise radiation shielding material,

a lifting mechanism for raising the threshold when the door is closed and lowering the threshold when the door is open,

wherein the threshold blocks radiation leakage under the door when the door is closed and permits substantially unobstructed access through the doorway when the door is open.

39. The apparatus of claim 38 wherein a portion of the threshold is above the bottom of the door when the door is closed.

40. The apparatus of claim 39 wherein the threshold retracts substantially under its own weight when the door is opened.

41. A modular structure for housing a radiation source comprising:

a plurality of free standing transportable modules connected to form a central treatment area and a barrier substantially surrounding the central treatment area, the central treatment area adapted for human occupation and to contain a therapeutic radiation source, at least one of the modules comprising a portion of the central treatment

area and including a support frame for holding a piece of radiation equipment in the central treatment area,

the barrier including first and second spaced apart rigid walls and a quantity of radiation shielding filler material contained between the first and second walls, the quantity of filler material sufficient to substantially reduce the measurable radiation level outside the central treatment area when a radiation source is placed in the central treatment area.

42. The structure of claim 41 wherein:

the at least one module comprising the support frame comprises at least a first section including the support frame and a second section removably coupled to the first section,

wherein the first section can be removed from the second section to allow the radiation equipment to be removed from the treatment area, the first and second sections comprising a portion of the barrier zone, and

wherein the second section includes a wall between the first section and a portion of the barrier zone in the second section for containing the radiation shielding filler material in the barrier while the first section is being removed.

43. The structure of claim 42 further comprising a second plurality of modules above the first plurality to form a roof barrier zone, at least one of the second plurality of modules over the barrier zone of the first section including a floor member for holding

radiation shielding filler material in the roof barrier zone when the first section is being removed.